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Why study intraspecific variation: a comment on Harding et al.

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Harding et al. (2019) touches on an import topic in our rapidly changing world – how can we predict and understand the responses of organisms to anthropogenic noise, and how can we use the information to mitigate negative effects of noise on populations and communities. The authors hereby highlight the importance of considering variation within populations in individual responses. Intraspecific variation is a topic that has received much attention in recent years and is by now generally accepted as a factor that needs to be considered when investigating responses of populations to environmental change (Sih 2013). Yet, fewer than 10% of the studies identified by Harding et al. consider intraspecific variation in responses to noise. This number has to increase as knowledge about individual variation not only informs us about the possibility of adaptation to new conditions – phenotypic variation is the raw material for natural selection – but also increases our knowledge of the mechanisms behind the impacts of noise on populations. Only when the mechanisms are known can we develop efficient strategies for mitigating negative effects of noise on populations and communities. An understanding of individual variation can clarify which individuals are most sensitive to noise and which are best able to cope with the disturbance, and how differences in coping ability depend on individual characteristics. This information can then be used to predict how populations will develop under noise and which management strategies are needed to maintain viable populations and diverse species communities. Thus, an increased understanding of individual variation can help us predict how populations on average will develop in a changing world.

Behavioural ecology has here of central role to play, as it links phenotypes to fitness under specific environmental conditions. It illuminates the interaction between the individual and the environment that underlies intraspecific variation. As Harding et al. point out, both intrinsic and extrinsic factors influence individual variation, but the distinction between them is also blurred. The extrinsic environment influences intrinsic characteristics (and to some extent vice versa): individuals living in different patches within a habitat, or who are born at different times, are exposed to different environmental conditions and thus develop different characteristics, such as body size, boldness, or stress tolerance, and can therefore differ in their responses to noise. Behavioural ecology, especially when combined with genetic studies, can increase our insight into how different individuals respond to environmental change, why they respond as they do, the consequences of the responses for populations and communities, and the management strategies that are needed to mitigate any negative effects on populations and communities (Wong and Candolin 2015).

Exactly how such studies on the impact of intraspecific variation on populations and communities should be performed is still an open question for many species: which individual characteristics and behaviours should be measured, and what is the appropriate time and space scale to consider? To advance the research field, a framework should be constructed that clarifies which factors need to be considered for species with different life histories living under different conditions. Although we are not yet there, the strength of the paper by Harding et al. lies in providing suggestions on the design, implementation and reporting of studies on individual variation in relation to noise, and how the information can be used to mitigate negative effects of noise on populations and communities. Thus, the paper has the potential to improve the quality of data collected, as well as enlighten us on how to use of the data in conservation work. The review is thus highly timely with an important message – the importance of considering individual variation in responses to disturbances – a message that needs to be echoed across studies on anthropogenic disturbances.

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